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REMARKS

Claims 1-27 are pending in the present application. Claim 28 was previously cancelled. No new matter has been added. Reconsideration is respectfully requested.

Attorney for Applicant wishes to thank the Examiner for the courtesy extended during the telephonic interview discussing the Lee publication on Friday August 11, 2006.

Claims 1-4, 7, 9, 14, and 16-17 are rejected under 35 U.S.C. § 102(e) as being anticipated by Lee (U.S. Publication No. 2003/0109140 A1). This rejection is hereby respectfully traversed.

In making the rejection, the Examiner refers to a layer designated "60" in the text at paragraph 27 of the Lee publication. As discussed in the telephonic interview and as described in the Response previously mailed by Applicant, the Lee publication text at paragraph 27 is in error.

Upon close examination of this reference patent publication, it becomes clear that the reference to HSG 60 should have been to layer 62 in Figures 6 and 7, and not to layer 60. Paragraph 24 of the publication describes depositing a liner 60 in the "collar divot" 55 of Figure 6. Paragraph 25 continues to describe this liner as a "silicon nitride liner layer 60". Paragraph 26 then describes forming a "selective HSG 60"; however this is clearly erroneous given that the silicon nitride liner layer is already designated 60. Paragraph 27, the paragraph relied upon by the Examiner in making the rejection, and then repeats the error describing polysilicon layer "60".

As previously submitted in the prior response mailed by Applicant, this understanding (that the Lee published application text is in error) was confirmed when the resulting corresponding U.S. Patent No. 6,759,335, issued July 6, 2004 was compared to the Lee

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application. In the patent specification, the silicon (polysilicon layer) described by Lee has been correctly identified as element 62, the text now recites:

A silicon nitride liner or other barrier layer may be formed using chemical vapor deposition (CVD) or atomic layer deposition (ALD) methods. This liner layer 60, not shown, is formed within the collar divot 55. The liner layer may have a thickness of between about 5 and 30 nm. The liner layer is optional to the process of the invention. The liner layer suppresses excess out-diffusion of dopants into the source/drain region and to prevent dislocation in the silicon layer, which may cause leakage. The liner layer is optional in the HSG process because HSG will not grow on crystalline silicon due to lack of surface mobility of silicon atoms.

Now a selective deposition process forms a buried strap. A conductive layer is deposited selectively. This layer must serve as a dopant source. A selective hemispherical grain (HSG) method is preferred. If a HSG method is not used, another selective deposition method such as SiGe, selective polysilicon, or pseudo-epitaxial silicon methods may be used.

The preferred selective HSG polysilicon process will now be described. Preferably, the optional surface amorphization step by plasma doping has been performed to provide surface mobility of the silicon atoms in 54 to promote HSG formation. Now, selective HSG 62 is formed as is conventional in the art for stacked capacitor applications, as shown in FIG. 6.

The polysilicon 62 (or other conductive layer) can be doped in-situ during or immediately after the deposition step. (Col. 3 lines 50-67, and Col. 4, lines 1-11).

Thus, Lee provides a horizontal layer of silicon 62, but does not disclose a silicon layer formed on sidewalls as recited in the method steps of Claim 1. As the relied upon reference does not show, teach or suggest the steps of Claim 1, Applicant believes Claim 1 is allowable over the rejection. Accordingly reconsideration and allowance are requested.

Claims 2-4, 7, 9, 14 and 16-17 depend from and add limitations to the method of Claim 1 and incorporate the allowable steps of Claim 1. Accordingly these dependent claims are also believed to be allowable, and reconsideration and allowance are therefore requested.

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Claims 5-6, 8, 10-13 and 18-24, are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee (U.S. Publication No. 2003/0109140 A1) in view of Chung et al. (U.S. Patent No. 6,734,106). This rejection is also hereby respectfully traversed.

As argued above, the Lee publication does not show teach or suggest the elements of the claimed inventions. The Examiner cites the added patent to Chung for adding the elements of certain temperature ranges claimed, and certain pressure ranges claimed, for the required gas phase doping. However, Chung does not cure the deficiencies of the primary reference to Lee. Simply stated, adding Chung to Lee does not provide a combination of references that shows teaches or suggests the claimed invention, as the required steps recited in the claims that are not disclosed in Lee are also not present in Chung. Accordingly reconsideration and allowance are respectfully requested.

Similarly, Claim 15 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Lee (U.S. Publication No. 2003/0109140) in view of Cheong (U.S. Publication No. 2003/0186533). This rejection is also hereby respectfully traversed.

Cheong was cited for performing the gas phase doping as an ex situ process. However, again the combination of references does not show, teach or suggest the elements of Applicant's claim because the added reference does not cure the deficiencies of the primary reference. Accordingly, Claim 15 is also believed to be allowable over the rejection. Reconsideration and allowance are therefore requested.

Claims 25-27 were also rejected under 35 U.S.C. § 103(a), as being unpatentable over Lee (U.S. Publication No. 2003/0109140) in view of Chung et al. (U.S. Patent No. 6,734,106) as applied to claim 18 above, and further in view of Cheong (U.S. Publication No. 2003/0186533). This rejection is also respectfully traversed.

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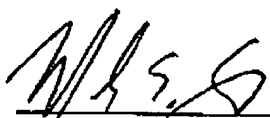
Claims 25, and then 26-27, depend from and recite additional steps on the method of Claim 18. The added references of Chung and Cheong were cited for providing the particular steps of these dependent claims. However, the method of the parent claim, 18, recites novel steps not shown, taught or suggested by the combination for the reasons given above, the combination does not show, teach or suggest at least the required steps of depositing a silicon layer to continuously cover the dielectric lining the sidewalls of a trench, and then gas doping the silicon layer. Accordingly, these dependent claims that incorporate the allowable steps of Claim 18 are also believed to be allowable. Reconsideration and allowance are therefore respectfully requested.

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EXPEDITED PROCEDURE  
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In view of the above, Applicant respectfully submits that this response complies with 37 C.F.R. § 1.116. Applicant further submits that the application is in condition for allowance. No new matter has been added by this response. It is respectfully requested that the claims be allowed and that the case be passed to issuance. If the Examiner should have any questions, please contact Applicant's attorney at the number listed below. No fee is believed due in connection with this filing. However, in the event that there are any fees due, please charge the same, or credit any overpayment, to Deposit Account No. 50-1065.

Respectfully submitted,

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Date

  
Mark E. Courtney  
Attorney for Applicant  
Reg. No. 36,491

Slater & Matsil, L.L.P.  
17950 Preston Rd., Suite 1000  
Dallas, TX 75252  
Tel: 972-732-1001  
Fax: 972-732-9218